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### [1. AF141-063: Modeling the Impact of Silica Particle Ingestion on Turbomachinery Life](#)

Release Date: 11-20-2013 Open Date: 12-20-2013 Due Date: 01-22-2014 Close Date: 01-22-2014

OBJECTIVE: Develop a decision support tool to determine the impact of silica particle ingestion on component service life of the engine hot section. DESCRIPTION: Operational requirements of commercial and military aircraft often render the traditional method of total avoidance of silica-rich particle contaminate ingestion infeasible. The 2010 Iceland volcanic ash cloud was of such a large ...

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### [2. AF141-064: Additive Metal Manufacturing \(AMM\) Process Development for Gas Turbine Engine Component Repair](#)

Release Date: 11-20-2013 Open Date: 12-20-2013 Due Date: 01-22-2014 Close Date: 01-22-2014

OBJECTIVE: Develop and validate an additive-metal manufacturing repair process for complex engine components in aging Air Force (AF) fleets. DESCRIPTION: Gas turbine engine components experience damages such as fatigue, foreign object damage (FOD), erosion, and fretting wear that make the sustainment of fleets burdensome. Damaged components in most AF fleets are usually replaced with new ...

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### **3. AF141-065: Structural Health Monitoring (SHM) Methods for Aircraft Structural Integrity**

Release Date: 11-20-2013 Open Date: 12-20-2013 Due Date: 01-22-2014 Close Date: 01-22-2014

OBJECTIVE: Develop fuse-like SHM techniques for the ASIP environment. Methods must be reliable, low cost, and durable. Methods must reduce maintenance burden, while maintaining safety. DESCRIPTION: The U.S. Air Force utilizes a damage-tolerant design approach to ensure the structural safety and reliability of the airframes on its fleet. A critical facet of this damage-tolerant design appro ...

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### **4. AF141-066: Use more accurate aircraft usage data in predicting life and scheduling inspections**

Release Date: 11-20-2013 Open Date: 12-20-2013 Due Date: 01-22-2014 Close Date: 01-22-2014

OBJECTIVE: Obtain a more accurate prediction of remaining life and inspection interval for an individual aircraft by converting actual aircraft usage data into stresses on the structure via physics-based, real-time aeroservoelastic simulations. DESCRIPTION: The process of determining initial or remaining aircraft structure life has not significantly changed in 50 years. It is still a high ...

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### **5. AF141-067: Structural Reliability Analysis**

Release Date: 11-20-2013 Open Date: 12-20-2013 Due Date: 01-22-2014 Close Date: 01-22-2014

OBJECTIVE: The objective is to develop a structural reliability analysis calculation tool that has the capability and flexibility to correctly model the physics of the variety of possible post-inspection structural repair options. DESCRIPTION: The current structural reliability analysis software used by the USAF models the post-inspection condition of the structure as a repair crack size d ...

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### **6. AF141-068: Generic Power/Propulsion Microcontroller for Unmanned Aircraft Systems (UAS)**

Release Date: 11-20-2013 Open Date: 12-20-2013 Due Date: 01-22-2014 Close Date: 01-22-2014

OBJECTIVE: Develop and demonstrate a small, common controller that can efficiently control all aspects of propulsion and power management for UAS vehicles. DESCRIPTION: The use of UASs has greatly increased over the last 12 years and these systems are assuming greater operational roles in the field, becoming force multipliers for the military. Current controls for UAS propulsion, especiall ...

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**7. [AF141-070: Lithium-Ion \(Li-ion\) Battery Electrolytes using Nonflammable, Room-Temperature Ionic Liquids](#)**

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: The purpose of this effort is to develop an ionic liquid based electrolyte for lithium-ion batteries that is nonflammable, has a high ionic conductivity over a wide temperature range, and is electrochemically stable to ensure long battery lifetimes. DESCRIPTION: Rechargeable Li-ion batteries can fail violently when subjected to an internal electrical short, are overheated, crush ...

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**8. [AF141-071: Safe, Large-Format Lithium-Ion \(Li-ion\) Batteries for Aircraft](#)**

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: The purpose of this effort is to develop safe, large-format aircraft Li-ion batteries where propagation of a cell failure is minimized. DESCRIPTION: Rechargeable Li-ion batteries can fail violently when subjected to an internal electrical short, are overheated, crushed, or when then are overcharged/overdischarged. Recent events such as the grounding of a commercial aircraft due ...

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**9. [AF141-072: Fiber-Optic-Distributed Temperature Sensing System](#)**

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop a fiber-optic-distributed sensor system that will sense bleed air leaks in the propulsion, environmental control, and thermal management systems (TMSs) to increase survivability throughout the operating mission of advanced tactical aircraft. DESCRIPTION: Advanced tactical aircraft are required to provide protection to fire throughout the operating mission flight envelope ...

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**10. [AF141-073: Single-port Fiber-optic Probe for Imaging and Spectroscopy in Practical Combustion Systems](#)**

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop and demonstrate a compact, fiber-optic-based probe enabling multidimensional imaging and line-of-sight absorption spectroscopy for local measurements of gas properties (e.g., temperature and combustion species) in practical combustion

systems. DESCRIPTION: Specifically desired is a multi-purpose probe enabling a number of key measurements in practical devices that include ...

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